

What is claimed is:

1. A system for endoscopic suturing comprising:
an endoscope locatable in the body of a patient having a flexible shaft;
a flexible tube having first and second ends, and coupled to said endoscope to be movable
with said shaft of said endoscope;
a tip coupled to said shaft of said endoscope having an opening through which said
second end of said tube is received; and
at least one tissue suturing instrument having a shaft locatable through said first and
second ends of said tube.

2. The system according to Claim 1 further comprising:
means for attaching said tube at a plurality of locations along said shaft of said endoscope
to enable said tube to be substantially coaxial with said shaft of said endoscope while movable
through said attaching means.

3. The system according to Claim 1 further comprising:
a cannula attached to said first end of said accessory tube in which said shaft of said
suturing instrument passes through cannula to said tube.

4. The system according to Claim 1 wherein said shaft of said suturing instrument is
at least partially flexible to enable passage through said tube.

5. The system according to Claim 1 wherein said tissue suturing instrument further
comprises means for engaging tissue having a sew tip with a gap, said sew tip being coupled to
said shaft of said tissue suturing instrument, and a sleeve over said sew tip having one end
capped and an opening to at least said gap, and said system further comprising means for
providing suction is a channel along said shaft to said gap of said sew tip to enable tissue to be
pulled into said gap.

6. The system according to Claim 5 wherein said tissue suturing instrument has at least one needle in said sew tip, and means for driving said needle forward through said suctioned tissue into a ferrule having one end of suture, and retracting said needle through said suction tissue with said ferrule.

7. The system according to Claim 1 wherein said suturing instrument further comprises a tissue engaging end coupled to said shaft, and said shaft has a channel for applying suction to said tissue engaging end of said tissue suturing instrument, and means for connecting to said channel through said shaft for applying vacuum establishing said suction.

8. The system according to Claim 1 wherein said suturing instrument further comprises a tissue engaging end coupled to said shaft of said suturing instrument and a housing, in which said shaft of said suturing instrument has a first section and a second section, and said first section is rigid and extends from said housing, and said second section is flexible and extends from the first section to the tissue engaging end of said suturing instrument.

9. The system according to Claim 8 wherein said first section of said shaft has a rigid tube and a first guide member in said tube having a plurality of tracks for at least one needle and suture, and said second section of said shaft has a second guide member having a plurality of tracks for at least one needle and suture, and said shaft has a coupler member for coupling said first and second guide members to each other.

10. The system according to Claim 9 wherein a wire is attached to said coupler member through said second guide member and attached into tissue engaging end.

11. The system according to Claim 8 further comprising means for translating rotation of one of said housing and said first section of said shaft to said second section of said shaft and said tissue engaging end of said suturing instrument.

12. The system according to Claim 8 wherein said suturing instrument has at least one needle which extends through said shaft of the suturing instrument to said tissue engaging end.

13. The system according to Claim 8 wherein said suturing instrument has one or more needles which extends through said shaft of the suturing instrument to said tissue engaging end, in which each of said needles comprises first and second members and a spring which couples said first and second members, and said second member has a tip positionable in said tissue engaging end.

14. The system according to Claim 13 wherein said second section of said shaft has a tube having holes extending through said tube of said second section for at least said needles.

15. The system according to Claim 13 wherein said second section of said shaft has a flexible tube for each of said needles, and each of said needles passes through said flexible tube of said second section to said tissue engaging end.

16. The system according to Claim 15 wherein said flexible tube comprises a spring having two ends and having an outer sheath attached to said two ends to restrict elongation of the spring of said flexible tube while enabling flexure of the tube.

17. The system according to Claim 13 wherein said needle extends through said shaft of the suturing instrument and said spring of said needle is located in said flexible section to assist in flexibility of said needle.

18. The system according to Claim 13 wherein each of said needles further comprises a cable which couples said spring between said first and second members.

19. The system according to Claim 1 wherein said endoscope is a gastroscope.

20. The system according to Claim 1 wherein said suturing instrument operates independently of said endoscope.

21. The system according to Claim 1 further comprising a suture securing instrument having a shaft locatable through said first and second ends of said accessory tube.

22. The system according to Claim 21 wherein said shaft of said suture securing instrument is at least partially flexible to enable passage through said accessory tube.

23. The system according to Claim 21 wherein said suture securing instrument further comprises means for retaining in a sleeve member the two free ends of a loop of suture extending through tissue, and means for cutting the two free ends of the loop of suture near said sleeve member.

24. The system according to Claim 1 wherein said suture securing instrument operates independently of said endoscope.

25. The system according to Claim 1 wherein said endoscope provides means for viewing the suturing instrument.

26. The system according to Claim 1 wherein said shaft has a channel for applying positive or negative air pressure to said end of said tissue suturing instrument, and means for connecting to said channel through said shaft for applying said positive or negative air pressure.

27. The system according to Claim 1 wherein said suturing instrument further comprises a tissue engaging end coupled to said shaft of said suturing instrument, in which said shaft has a channel to said tissue engaging end and an opening to said channel, and said tube has a port capable of enabling suction to be provided to said tissue engaging end through said opening and channel of said shaft, in which said opening of said tip has a seal for engaging with

said tissue engaging end of said suturing instrument to enable said suction to be provided through said opening of said shaft.

28. The system according to Claim 1 wherein said shaft of said endoscope has a distal end and said tip is coupled to said shaft at said distal end.

29. The system according to Claim 1 further comprising means for locking at the tip of said tube the position of the suturing instrument with respect to said tube.

30. The system according to Claim 29 wherein said suturing instrument further comprises a tissue engaging end coupled to the shaft of said suturing instrument and said tissue engaging end being substantially cylindrical with an outer surface having one or more protrusion members, and said opening of said tip having one or more slots into which said protrusion members are received to lock the position of the suturing instrument with respect to said tube at said tip.

31. The system according to Claim 1 wherein said suturing instrument further comprises a tissue engaging end coupled to the shaft of said suturing instrument, and means for steering said tissue engaging end.

32. The system according to Claim 31 wherein said steering means is one of hydraulically and mechanically actuated.

33. A method for suturing tissue comprising the step of:
locating an endoscope coupled to an accessory tube through the gastrointestinal tract of a patient;
inserting a suturing instrument through said accessory tube to place two ends of a loop of suture through tissue of the gastrointestinal tract;

removing said suturing instrument to leave a loop of suture in the tissue having two free ends extending from the accessory tube;

inserting a suture securing instrument having a distal end with a sleeve member through which the free ends of the suture loop are drawn to the suture in the tissue to crimp the sleeve member and cut the free ends of the suture; and

removing said suture securing instrument from said accessory tube.

34. The method according to Claim 33 wherein said inserting step further comprises the step of:

providing a shaft and a tissue engaging end coupled to said shaft having a sew tip with a gap, and a sleeve over said sew tip having one end capped and an opening to at least said gap; and

applying suction to a channel along said shaft to said gap of said sew tip to enable tissue to be pulled into said gap when each end of said loop of suture is placed in tissue.

35. An attachment for a flexible endoscope having a shaft extending to said distal end comprising:

a flexible tube coupled to said endoscope to be flexible with said shaft of said endoscope; and

a tip coupled to said shaft of said endoscope having an opening through which said tube is received.

36. The attachment according to Claim 35 wherein said shaft of said endoscope has a distal end and said tip is coupled to said shaft at said distal end.

37. The attachment according to Claim 35 further comprising:

a plurality of guides each attached at a location along said shaft of said endoscope and having an opening through which said tube extends in which said tube is capable of moving through said opening in response to flexing of said shaft of said endoscope.

38. The attachment according to Claim 35 further comprising:
a cannula attached to said tube and having a sealable passage in communication with said tube.

39. The attachment according to Claim 35 wherein said tube enables access of an instrument independent of said endoscope.

40. A suturing instrument comprising:
a housing;
a shaft extending from said housing;
a tissue engaging end coupled to said shaft at the distal end of the instrument;
one or more needles which extend through said housing through said shaft to said tissue engaging end;
a suture channel extending through said housing and said shaft to said tissue engaging end;
said tissue engaging end having a sew tip with an opening through which said needles are extendable to each capture one end of suture extending through said suture channel to said sew tip; and
said shaft representing an assembly having a first section and a second section, said first section being rigid and extends from said housing, and said second section being flexible and extends from the first section to the tissue engaging end of said suturing instrument.

41. The suturing instrument of Claim 40 wherein said opening of said sew tip represents a first opening and said suture channel having first and second end in which said first end is adjacent said sew tip, and said suturing instrument further comprises:

a sleeve over said sew tip having one end capped and an second opening in communication with said first opening of said sew tip;

means for selectively providing suction to said suture channel along said shaft to said first opening of said sew tip to enable tissue to be pulled into said first opening through said second opening of said sleeve when said needle extends through said opening of said sew tip; and

means for selectively closing said second end of said suture channel to enable suction to be provided at said sew tip by said suction providing means.

42. The suturing instrument of Claim 40 wherein said needle comprises first and second members and a spring which couples said first and second members, and said second member has a tip positionable in said sew tip.

43. A suture securing instrument comprising:

a housing;

a shaft extending from said housing;

a distal tissue end coupled to said shaft;

said shaft representing an assembly having a first section and a second section, said first section being rigid and extends from said housing, and said second section being flexible and extends from the first section to the distal end of said instrument;

means for retaining in a sleeve member at said distal end two free ends of a loop of suture extending through tissue; and

means for cutting the two free ends of the loop of suture near said sleeve member.

44. A system for endoscopic suturing comprising:

an endoscope having shaft and an internal channel along said shaft locatable in the body of a patient;

a suturing instrument having at least a partially flexible shaft locatable through said internal channel of said endoscope for enabling suturing of tissue of the patient.